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ABSTRACT

The recent experimental literature on the acquisition of English antonyms is reviewed, with special reference to the position of Eve Clark and the particular ontogenetic assumptions her position entails. The assumptions examined are: (1) in a hierarchically organized lexical domain, the order of acquisition appears to be from the top of the hierarchy downward; (2) linguistically unmarked or semantically positive terms are acquired before their marked or negative counterparts; and (3) systematic misinterpretation of the marked or negative term indicates confusion between it and the unmarked term. It is shown that many recent findings are at variance in some major way with predictions from Clark's theory. A recurrent problem has been that children's comprehension task performance is confounded with their behavioral biases specific to the linguistic and nonlinguistic contexts in which the lexical terms are presented. (Author/AMH)

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The Acquisition of English Antonymic Terms: Recent Evidence and its Implications for a Semantic Feature Acquisition Theory*

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Abstract

The recent experimental literature on the acquisition of English antonyms is reviewed, with special reference to the theoretical position of E. Clark (e.g., 1973b). The review critically examines the three major ontogenetic assumptions of Clark's theory in light of numerous recent findings, many of which are at variance in some major way with predictions from the theory. In many instances, new data are available which call into question previous findings. A recurrent problem has been that children's comprehension task performance is confounded with their behavioral biases specific to the linguistic and nonlinguistic contexts in which the lexical terms are presented.

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Semantic feature theories of the acquisition of word meaning are examples of structural descriptions which have evolved into process explanations. Semantic feature analysis of word meaning has a long and respectable history in linguistics and psycholinguistics, as exemplified by the work of Bierswich (1967, 1969, 1971) Katz and Fodor (1964), Osgood (1957, 1970a,b), Weinrich (1971), and others. In its most general form, semantic feature theory assumes that the meaning of individual lexical items can be characterized as a set of values on a concatenation of underlying meaning components which are taken to describe all the entries in a common lexical field. What these components are, how they are discovered, and how they are organized into a comprehensive structure varies with the theorist; they are frequently thought of as comprising a hierarchy, where the topmost feature is universal to all words in the domain and features further down are both more specific to limited subsets of the words in the domain and are contingently dependent upon the more superordinate features in the hierarchy.

As a theory of language acquisition, this general structural account of meaning can be coordinated with certain psychological assumptions about the ontogenesis of meaning to predict such things as stages of acquisition in a particular domain, the order of acquisition of words in the domain, errors of interpretation which may occur, and so forth. By varying these ontogenetic assumptions, the same structural account could yield widely varying predictions about the course of meaning acquisition.

This paper will examine the particular version of semantic feature theory of word acquisition which is due to Eve Clark (1971, 1972, 1973a,b), review the particular ontogenetic assumptions this position entails, and examine the extent to which the resulting predictions coincide with the available data.

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Clark's position is that the acquisition of a term involves inferring the common conditions of application which are present whenever the term is used. Upon hearing an as-yet-unacquired lexical term, the child observes one or two of the most salient features of the object or event to which the term appears to refer, and infers that these features are the conditions of application for use of that term. Through progressive experience the child differentiates further such conditions, eventually building up a cumulative list of criterial features until acquisition is complete and all conditions of application are known. These conditions Clark identifies as semantic features. For particular lexical domains (e.g., spatial adjectives, time reference, etc.), the features form a hierarchically organized system.

As the description above implies, Clark assumes that children learn the meanings of words one semantic feature at a time, and, further, that the order of progress is from the broader, less specific (superordinate) features of the hierarchy to the more specific, hierarchically dependent (subordinate) features. This aspect of Clark's theory will be referred to as the top-to-bottom assumption.

As a corollary to the top-to-bottom assumption, items which appear lower in a feature hierarchy are relatively more complex than those which occur at a higher point (Clark, 1972, p. 751). According to Clark, terms varying in the number of criterial features will be acquired in the order from the simpler terms to the more complex.

The top-to-bottom assumption has received support from studies with dimensional adjectives, which have employed several different methods, including opposites elicitation (Clark, 1972), comprehension techniques (Brewer & Stone, 1975; Donaldson & Wales, 1970; Eilers, Oller & Ellington, 1974; Townsend, 1975; Wales & Campbell, 1970; Tashiro, Note 3), and the elicitation of verbal descriptions (Richards, 1974; Wales & Campbell, 1970).

It has been observed in opposites elicitation (Clark, 1972) and production studies (Richards, 1974; Wales & Campbell, 1970) that children often substitute dimensionally simpler adjectives where more complex ones would apply. The phenomenon of substitution is taken by Clark (1972, 1973b) as an example of semantic overextension: Once a term is understood as having certain semantic features, its usage will be overgeneralized to refer to other objects or events in the child's experience having the same features but for which a more specific or appropriate word has not yet been acquired. Clark (1973b) cites numerous instances of semantic overextension appearing in the many diary studies of early speech; very young children frequently apply an acquired term inappropriately to a referent for which no more precise term has been acquired. Clark argues that, in so doing, the child perceives certain features (e.g., shape, function) to be common to both the correct and the incorrect referent for the term, and infers that this common feature is criterial for the use of the acquired term.

Clark further assumes that the linguistically unmarked (or positive polar) term is acquired first, at which point the marked (or negative polar) term is used synonymously with it. This is because marking entails an additional semantic feature, the Markedness (Clark, 1973b), + Secondary

(Clark, 1972, p. 751), or -Polar (Clark, 1973b) feature. The acquisition of the meaning of the marked term is said to presuppose acquisition of the unmarked term, hence, additional information is required before the marked term is differentiated from the unmarked. Thus, the unmarked term is semantically less complex and hence acquired earlier than the marked term, which has for a time all and only those features contained in the unmarked term, and is therefore synonymous with it until the additional feature of markedness is learned. The unmarked/marked term confusion is a special case of the phenomenon of semantic overextension, where the meaning of the unmarked term is overgeneral, applying also to cases where the marked term should apply.

The multiple ontogenetic assumptions of Clark's theory build upon each other, such that later assumptions make sense only if earlier ones are tenable. We shall now consider the evidence for this theory in detail. The most compelling support for the top-to-bottom assumption comes from studies of the acquisition of adjectives referring to relative extent on the spatial dimensions.

Dimensional Adjectives

Order of Acquisition. Clark (1972) elicited semantic opposites (e.g., "If I say good, you say (bad)," "If I say happy, you say (sad)") from 4;0 to 5;5 year old children for dimensional and spatio-temporal adjectives. From analysis of the age at which a significant proportion of the children responded with the correct opposite, the order of acquisition of the dimensional adjectives appeared to be (from earliest to latest): big-small, long-short, tall-short, high-low, old-young, thick-thin, wide-narrow, deep-shallow. For spatio-temporal adjectives, the order which emerged was (from earliest to latest): in front-in back, up-down, in-out, on-off, first-last, over-under, early-late, above-below, ahead-behind, before-after.

A number of studies have used comprehension tasks involving dimensional adjectives. Donaldson and Wales (1970) had children select objects from sets which varied respectively on the dimensions of size, length, thickness, height, elevation (high-low) and girth (fat-thin). Initially the child had to select from the superlative forms (e.g., "Point to the longest/shortest") and then from the comparative, where one object was the standard and the child had to "point to one that is (long)er/(short)er" than the standard. For the superlatives, there were significantly more correct responses to the positive or unmarked than to the negative or marked adjectives (less so for the comparatives). Wales and Campbell (1970) analyzed these data for longitudinal effects. The order of correct responding on the superlatives was big-wee, long-short, high-low, and thick-thin, when the stimulus set varied on a single dimension or varied directly on two dimensions simultaneously. Adjectival differences with the comparatives were less clear.

Brewer and Stone (1975) used sets of four objects, each object representing one pole on a single dimension, with two dimensions combined to the set. The dimensions combined were high-low with thick-thin, wide-narrow with long-short, and tall-short with deep-shallow. The child was instructed to point to the instance representing each pole of each dimension in turn in counter balanced order, and trials from other dimension pairs were interspersed between trials within dimension pairs.

In all these studies, the order of acquisition for common dimensional adjectives appears to be essentially as Clark (1972) reported. This order of acquisition is compatible with the top-to-bottom assumption if one accepts the semantic analysis (Bierwisch, 1967; Clark, 1972) that big-small are the most dimensionally non-specific of these terms, referring only to size in a space having any number (n) of dimensions. It represents the highest point in a hierarchy which begins at the top with the general specification of spatial dimensionality in any set and number of dimensions. The next lower point in the hierarchy (and next to be acquired) is occupied by the terms which specify size in a single criterial dimension, that being either the vertical (tall-short, high-low) or the horizontal (long-short). Lower down are the two-dimensional specifiers wide-narrow and deep-shallow, and finally the three-dimensionals thick-thin and fat-thin. Clark's proposal is that big-small are used initially to refer to extent on any dimension until the specific dimensional reference of the more subordinate terms is acquired.

Semantic overextension. Children's use of the general size terms big-small where a mature speaker would use a dimensionally specific term such as long-short is taken as an example of semantic overextension (Clark, 1973b). Until additional semantic features are elaborated, a relatively complex (subordinate) term will be taken as having the meaning of a relatively simpler (superordinate) one within the same hierarchy. In comprehension, this means that the specific term is interpreted as having the more general meaning; in production it apparently means that the simpler term is uttered where the complex one would apply.

A study of developmental changes in interpretation of big (Maratsos, 1973) suggests a different order of progress, however. Noting that previous studies seemed to suggest that older subjects are more likely than younger ones to interpret big as referring specifically to tall objects (Lumsden & Poteat, 1968) and more as referring specifically to longer arrays (Bever, Mehler, & Epstein, 1968), even when one of the alternatives is in fact bigger in terms of area or more in terms of number, Maratsos (1973) compared 3- to 5-year-old children's judgments of bigness when stimuli which were short, wide, and thick were paired with stimuli which were long, narrow, and thin. Adults and 3-year-olds judged bigness on the basis of overall area (i.e., width and thickness), but 4-year-olds consistently chose the vertically extended (i.e., taller) object as the big one.

To Maratsos this result means that there is a period of decreased understanding of the word big such that the once-general meaning ("gross overall size") becomes tied to the vertical dimension. When judging heaviness, the 4-year-olds always picked the object have the larger overall size (i.e., the bigger one), indicating that perception of comparative size is accurate, and the problem with big for these children is semantic. In addition to correctly responding to big, the 3-year-olds also responded correctly to long.

Thus, the phenomenon of "substitution" of big for more specific terms such as long could reflect a different ontogenetic course than the over-extension concept describes. Maratsos' result suggests that the child's originally correct notion of big undergoes a change during the fourth year

such that it takes on the specific character of longness, for a time losing its more general reference to gross overall size. Rather than overgeneralizing the complex term, Maratsos' subjects appear to have overspecified the simpler one, substituting a dimensionally specific meaning where a more general one had once been understood. Since they were given the alternative of interpreting big in its general sense, we must conclude from the behavior of these 4-year-olds that they judged the single dimensional sense to be the more correct interpretation of big, whereas younger children judged both the general sense of big and the specific sense of long correctly.

Non-simultaneous acquisition of antonyms. Numerous studies (Donaldson & Wales, 1970; Wales and Campbell, 1970; Clark, 1971, 1972, 1973b; Klatzky, Clark, & Macken, 1973) have found asymmetries in the usage and understanding of the marked and unmarked terms of antonym pairs referring to spatial dimensions, such as size, height, length, width, and so forth. Comprehension errors most frequently involve interpreting the marked or negative polar term as if it meant the unmarked or positive term, which is interpreted correctly. However, Brewer and Stone (1975) point to a consistent artifact of these studies: Children's comprehension is always tested with exemplars from a single dimension. The child's responses are limited to alternative values on only the dimension being tested; thus, systematic errors of comprehension always appear to be errors of synonymy, and a simple response bias toward choosing the more spatially extended of two objects when asked to, say, "find the tall one," or "find the shallow one," etc., could lead to both findings. Further, Townsend (1974, 1976) notes that, in such two-choice paradigms, performance with the marked term, while generally poorer than with the unmarked, nevertheless significantly exceeds chance levels of accuracy. Since errors can only be errors of oppositeness, the greater difficulty of one member of the pair appears superficially to be systematic interpretation of one term as having the meaning of the other. "A better test of the marking theory requires a situation in which the child can make an incorrect response other than the response appropriate to the unmarked comparative" (Townsend, 1976, p. 386).

Brewer and Stone (1975) gave the child a choice between dimensions as well as within them. For example, when instructed to find the tall object, the child had a choice of a tall object, a short object (the usual alternatives), a wide object and a narrow object, and so forth for different combinations of the six dimensions involved. Brewer and Stone found a significant tendency for their 3- to 5-year old subjects to err in favor of the same pole on the competing dimension. That is, if told, "find the short one," rather than choosing the wrong pole on the dimension of reference (e.g., the tall one), the children significantly more often chose the same pole on the wrong dimension (the narrow one) when they made an error in this task. Brewer and Stone did find that the marked terms were more often incorrect than the unmarked.

Testing the response bias hypothesis, Brewer and Stone included a procedure in which nonsense syllables were substituted for the adjectives in the task instructions. No evidence of a response bias favoring the extended end of the dimensions was found. However, Klatzky, Clark and Macken (1973) reported that significantly more trials were required for

3½ - 5-year-olds to learn nonsense syllable labels for the nonextended than for the extended ends of the dimensions of size, height, length, and thickness. That is, it took longer for them to learn nonsense labels for short objects as compared to long ones, small objects as compared to large ones, etc. Evaluating these conflicting reports regarding intradimensional response biases, it can be argued that such biases are better tested using unidimensional response alternatives, as Klatzky, et al. did, than using multidimensional alternatives, as Brewer and Stone did, since it is not known how the combination of dimensions itself might affect the behavioral bias. Also, Klatzky, et al. averaged performance over multiples trials, rather than the single trial test of response bias used by Brewer and Stone. Further, the demand characteristics of Brewer and Stone's procedure may have resulted in the nearly even distribution of responses over the four alternative objects (two marked and two unmarked) which were presented on each trial. There were multiple presentations of the same four objects within an apparently short span of time, each presentation paired with a new and different nonsense syllable. Thus, when on one trial the child is presented with high, low, wide, and narrow alternatives and instructed to point to the object called bup, and then in two or three trials the same combination of alternatives is presented with a new name (e.g., paz), the child's memory for his previous choice may be sufficient to cause him to select a new object to go with the second name. This is especially likely since the nonsense syllable series was interspersed between the second and third series of trials using instructions containing the actual linguistic terms being tested (e.g., long-short, wide-narrow, etc.). After two such series with actual antonyms, the child may have the idea that a different object is being named on each successive trial involving the same combination of alternatives. This makes it more likely the child will choose a different alternative on subsequent pairings of the same alternatives with different nonsense syllables. Thus, Brewer and Stone's evidence for a lack of response bias is not convincing. The result that unmarked terms are accurately interpreted more frequently than their marked counterparts may be explained by children's predilections for choosing the more spatially extended object on either of the dimensions combined on a single trial.

Eilers, Oller, and Ellington (1974) reported exactly the opposite comprehension bias. Their 2½ - 3½ year old subjects tended to confuse the unmarked member of dimensional adjective pairs for the marked one. That this tendency reflects a response bias and not a semantic confusion was confirmed when the authors performed their original comprehension procedures without the critical linguistic materials. Instead of substituting nonsense syllables for the critical lexical terms tested in the earlier procedure, as Brewer and Stone (1975), Carey (Note 1), Klatzky, Clark, and Macken (1973), and Wilcox and Palermo (Note 4) have done, Eiler et al. simply said, "Here are two x's (e.g., sticks), hand me one." The children showed a significant bias toward choosing the less extended of the objects on the dimension of size, and a consistent but nonsignificant tendency to do so with the length and width dimensions as well.

Eiler, et al.'s subjects were about a year younger than those employed in previous investigations which have reported asymmetries favoring the unmarked term. The authors suggest that this difference accounts for the

discrepancy in results. Different strategies of interpreting marked/unmarked terms may predominate at different ages--the earlier strategy being just the opposite of what Clark takes to be the universal tendency to acquire the unmarked member first and confuse the marked term for it. However, Eilers, et al, did not test older children with the same procedures, so the hypothesis that the difference between their results and those of other investigators is due to age (rather than to, say, differences in the reference materials) remains untested.

Eilers, et al. did substantiate the finding that the canonical order of acquisition between the pairs big-little, long-short, and wide-narrow is from the broader to the more dimensionally specific terms--a highly reliable finding for these spatial reference terms, and a consistent confirmation of the top-to-bottom assumption. But their finding of a systematic response bias among 2½ - 3½ year olds (even though in the opposite direction from that found with older children) in the absence of the linguistic stimuli, adds further weight to the response bias interpretation for children's systematically favoring the unmarked term in the usual comprehension task. Thus, response bias toward choosing the extended end of a dimension, coupled with the usual design constraint that only within-dimensional errors are possible, could account for both frequent findings that the unmarked term is acquired earlier and the marked term is used synonymously with it on such tasks.

From Brewer and Stone's result that errors favor the same pole on a different dimension, rather than the opposite pole on the same dimension, we might draw the conclusion that children acquire the polar feature of such adjectives prior to having acquired the specific dimension of reference, or, as they suggest, the polar feature is higher in the feature hierarchy. Susan Carey (Note 1) reports very similar findings in several experiments with 3- and 4-year-olds. Her suggestion is that what is understood about a word is first its relationship to some reference point as being either toward or away from zero, and only later the specific underlying dimension on which this relationship holds.[1]

Another test of the directionality of the unmarked/marked preference in comprehension tests with dimensional adjectives was performed by Townsend (1976). The chief difference between Townsend's study and previous studies (e.g., Donaldson & Wales, 1970) is that he employed an array of five objects (rather than the usual two) which took five progressively scaled values on a dimension as alternatives for the child's response. Townsend employed both comparative (e.g., "which peg is taller?") and superlative (e.g., "which peg is tallest?") forms of each term in successive tests on the same subjects. The antonyms in this study were dark-light, fat-skinny, more-less, more-fewer, tall-short, thick-thin, and high-low.

Townsend found no evidence of systematic confusion between the marked and unmarked terms of these dimensions for either linguistic form in the instructions. His principle analysis dealt with the tendency to choose the "opposite pole" in response to the questions with marked and unmarked terms (although what exactly is meant by an "opposite pole" response to the comparative form is not clear). For those terms for which the group data

at a given age (2;6-3;0, 3;0-3;6, or 3;6-4;0) did show some systematic bias toward opposite pole responses, Townsend looked at the behavior of individual subjects. He established that the result was due to a few particular children having consistent confusions between terms, but in only one case were these confusions consistent with the prediction of Clark's theory. That was with the term fewer, which was consistently interpreted as more by a "small number" of the 3;0-3;6 year olds. But for the children who interpreted the marked lower consistently as meaning the unmarked higher, they also interpreted higher as if it meant lower, i.e., they consistently reversed the meaning of the two terms. A few 3;6-4;0 year olds systematically chose the fatter object when asked for a skinnier one, but Townsend points out that fat-skinny is not linguistically a marked/unmarked pair but is rather simply positive or negative on psychological grounds.[2]

For some of the antonym pairs (fat-skinny, more-less, more-fewer, long-short, and thick-thin), correct responses were more frequent to the unmarked (or positive) than to the marked (or negative) term. But there was no interaction of marking with age on accuracy, indicating that improvement with age did not occur primarily on the marked adjectives.

The intriguing possibility exists that, with an ordered array of this sort, young children will focus upon adjacent items in the array, in effect interpreting either linguistic form as the comparative. Piaget (1967; Piaget & Szeminska, 1952) observed that children in the preoperational stage of cognitive development, asked to order items in a linear series on a dimension such as length, can impose the correct ordering on pairs of objects, but fail to correctly order successive pairs. That is, they correctly place any two items with respect to greater length, but they treat the pairs independently, as if they do not define a series. In Townsend's task, a child focusing on a single pair of objects instead of upon the full series might exhibit a bias toward choosing the more extended of the two objects, which could account for the greater accuracy of his subjects in responding to the unmarked term, even though a series of alternatives was provided.

In a production study with dimensional adjectives (Wales & Campbell, 1970), three- and four-year-olds on the average used unmarked adjectives more than twice as often than they used marked adjectives in response to questions. This has also been cited as evidence for the asymmetry of acquisition assumption. According to Clark (1973b), these data "show that children have a strong preference for using unmarked rather than marked dimensional terms in their descriptions. One reason for this . . . could be that they do not yet understand many of the marked terms" (p. 93). In the Wales and Campbell procedure, a story told orally by the experimenter was interrupted with questions about pictures which were germane to the story. For example, two characters climb a banana tree and pick a "great pile of bananas." A picture of two boxes, one large and one small, is then shown and the questions, "Which box would be the best one to put the bananas in?" and, "Why would that one be the best one to put the bananas in?" are asked, in that order.

It is no surprise that unmarked adjectives dominated the children's responses, since six of the eight questions clearly ask for the unmarked adjective, as in the example, where the appropriate response is "because it's bigger." If anything, it is somewhat surprising that the marked adjectives were used about one third of the time, since they were correct in only one fourth of the cases.

To summarize the evidence on the asymmetry of acquisition assumption for dimensional adjectives, it appears that design constraints have been largely responsible for what has been regarded as evidence in favor of this ontogenetic assumption. There is a reason to believe that 3½ - 5 year old children exhibit consistent response biases toward choosing the more extended of two objects, making it appear in the two-choice comprehension paradigm as if the marked member of a pair is consistently interpreted as having the meaning of the unmarked term. When the number of choices are expanded (Brewer & Stone, 1975; Townsend, 1976), the evidence for this assumption collapses. Furthermore, very young children (2½ - 3½ years) appear to have a comprehension bias which is the opposite of that predicted by the Clark theory (Eilers, Oller, & Ellington, 1974).

Temporal Reference

The acquisition of temporal reference has been a subject of investigation since Piaget (1955, 1971) elaborated the concept of time as a structural schema which develops in step with the more general stages of intellectual growth. More recently, H. Clark (1973), Cromer (1968) Ferreiro & Sinclaire (1971) and others have contributed to the scientific analysis of temporal reference as a developing linguistic system. Clark's (1970, 1971, 1972) analysis of the acquisition of temporal reference draws upon her data with the terms before and after. She found that sentences containing before are accurately interpreted earlier than sentences containing after. Initially, children rely on the order of mention to interpret the order of events in time, which Clark takes to mean that only the +TIME feature has been inferred. At the next stage, the feature -SIMULTANEOUS is acquired, with the result that the child understands that the terms refer to a serial relation between events in time, rather than contemporaneous events. Because before is the positive member of the pair, its reference to preceding events is understood earlier than the following-events reference of after. Thus, before and after are for a time both coded as +TIME, -SIMULTANEOUS, and +PRIOR. Clark found children at this stage interpret ordered commands containing before correctly while interpreting after commands incorrectly.

Amidon and Carey (1972), however, argue that children's difficulties with before and after are not entirely due to semantics. They used training procedures in which (a) some children acted out sentences which contained first and last as temporal markers and lacked the subordinate clause structure required by before and after, (b) some children acted out before and after sentences containing the necessary subordinating syntax, and (c) some of the later subjects received feedback as to the correctness of their responses. All subjects then received a test procedure in which either before-after or first-last sentences were presented. During training, subjects interpreting first-last sentences made far fewer errors than subjects interpreting before-after sentences, and feedback subjects began by making errors but quickly improved their performance. During the test, feedback subjects were significantly better at interpreting before-after sentences than were subjects receiving no feedback. The latter subjects tended to make errors in which the information in the subordinate clause was omitted, regardless of the position of the subordinate clause in the sentence.

Interpreting the pattern of error differences between experimental groups (and between their subjects and Clark's [1971]), Amidon and Carey demonstrated that children's tendency to ignore the information contained in subordinate clauses could interfere with comprehension of sentences containing before and after. They concluded that feedback served to alter this tendency, resulting in almost immediate, significant improvement in performance, showing that it was this response strategy, rather than failure to understand before and after, which accounted for poor performance on before-after sentences. Of course, the possibility exists that, rather than altering a strategy of ignoring subordinate clauses, the effect of feedback was to give the subject semantic information about the correct interpretation. An observation supporting this view is that children receiving both feedback and intonational stress on the temporal markers (before-after) during training did not exhibit greater or faster improvement over those receiving feedback alone; if feedback provides semantic rather than syntactic information, stress on the temporal terms should have further enhanced this effect. Finally, sentences containing first and last but having no subordinate clauses posed almost no problems of interpretation, although the semantic analysis of first and last is identical to before and after on the three features of +TIME, -SIMULTANEOUS, and ±PRIOR. Amidon and Carey also reported no significant tendency for commands with before to be more correct than those with after for the 3- to 5-year-olds in their study.

Barrie-Blackley (1973) had 5½ - 6½ year olds first repeat then act out sentences conjoined with before, after, or until. She did not obtain a high incidence of omissions of the information in the subordinate clause. Significantly more errors of interpretation were made with before than after, twice as many errors were made on sentences which reversed the order of occurrence of events in the surface structure, and 86% of the errors on event-reversed sentences interpreted events in their surface order rather than in their meaning sequence (both latter findings conform to the "order of mention strategy" described by Clark [1971]).

The lack of subordinate clause omissions may have resulted from previous administration of a repetition task with the same sentences. This task could have primed subjects to the information in the subordinate clause. Amidon and Carey discuss this possibility in relation to Clark's (1971) study, where, in a previous task, children were asked "when" questions about the events in the stimulus sentences. Amidon and Carey suggest that the feedback condition served the same function with their subjects, who then ceased to omit the information in the subordinate clause.

Why Barrie-Blackley's (1973) subjects should have made more errors with before, while Clark's (1971) made more errors with after cannot be explained on methodological grounds, since the two comprehension methodologies appear to have been essentially the same, with the exception of the type of previous task. The difference is apparently due to the different ages of the subjects: Clark's were 3 to 5 years while Barrie-Blackley's were 5½ to 6½. Why this should make a difference is not clear. However, in discussing why younger children (2½ - 3½) seem to have more difficulty with certain unmarked than with marked dimensional adjectives while older children (above 3½) err in the opposite direction, Eiler, Oller, & Ellington (1974) conjecture that the asymmetries

frequently observed in the acquisition of antonyms may be bidirectional. At one point in development, for instance, unmarked adjectives may be interpreted as their marked opposites, while at some later point the alternative confusion occurs. Thus, both overextension strategies occur, but at different ages. This possibility is at variance with Clark's theory, which does not allow for the unmarked or positive term to be interpreted as the marked or negative term, since the natural order of acquisition is from the unmarked to the marked, acquisition of the latter presupposing acquisition of the former.

In conclusion, it is by no means certain that the bias of Clark's subjects toward the "earlier acquisition" of before represents an irreversible developmental stage. But perhaps more problematic is Amidon and Carey's (1972) study, which leaves us with doubts as to the correct interpretation of the conflicting findings with before and after. The difficulty seems to lie in interpreting children's responses to words in syntactic contexts as if they were pure responses to the words themselves. So it is with before and after that they necessarily occur in sentences with subordinating syntax. Smith and McMahon (1970) claim that information in main clauses is more easily interpreted than information in subordinate clauses, Bever (1970a,b) reports that very young children often omit the subordinate clause when reproducing sentences, and Clark (1970) reported that the use of subordinate clause constructions generally followed use of coordinate clause constructions in the spontaneous speech of children 3½ years and older. In tasks such as Clark's (1971) and Barrie-Blackley's (1973), if the subordinating syntax could be omitted, as with sentences with first and last, the semantic interpretation of the lexical terms themselves would be left to determine performance. Whether this performance would agree with Clark's analysis or not will remain a question until some investigator finds a way to present verbal material containing before and after without the subordinating syntax.

Locatives

Clark (1973a) also studied acquisition of the locatives in, on, and under as cases-in-point of semantic overextension during early semantic development. She had 1;6 - 4;11 year olds place moveable objects in relation to different stationary objects according to instructions which contained either in, on, or under as the spatial preposition. The children could place the objects either "in" or "on" a tunnel and a box, "in" or "under" a truck and a crib, or "on" or "under" a bridge and a table. She found that very young children err in the direction of confusing on and under for in, or taking under to mean on. This is interpreted (Clark, 1973a) in terms of the relative semantic complexity of the three terms, in being less complex than on, which is in turn less complex than under. This is because in refers to a container-like recipient, on refers to a surface recipient, and under refers to a surface which also supports the recipient object. An analogy is made with dimensional adjectives, where acquisition proceeds from the simpler features to the more complex. Clark (1973a) argues that +Containment is the simpler semantic feature to acquire because it coincides with children's nonlinguistic behavioral predilection to place moveable objects inside container like objects. If the recipient has not got sides but has a supporting surface, the predilection then is to place objects on the surface. When an object has both containment and surface features, the containment

response predominates. Clark (1973a) obtained evidence of nonlinguistic response strategies in very young children which coincide with the hypothesized order of dominance of these behavioral predilections.

However, Wilcox and Palermo (1974) demonstrated that neither the semantics of the lexical entries in, on, and under nor the specific behavioral strategies proposed by Clark (1973a) determine children's responses in the task. Rather, there exists a simple tendency to place everyday objects in their natural relationships with one another, regardless of the instructions. They noted that, in Clark's (1973a) study, in each case the moving object had a "natural" relationship to the stationary object, and in each case, the natural relationship conformed to the instructions containing the semantically "simpler" term (as Clark analyzes it): A toy doll most naturally goes in (rather than on) a tunnel or box, in (rather than under) a truck or crib, and on (rather than under) a bridge or table. Wilcox and Palermo hypothesized that, if the child's knowledge of the usual relation of the moveable to the stationary object conflicts with the linguistic instruction, " . . . the contextual relations might be more important in determining the appropriate response than the linguistic relation" (Wilcox and Palermo, 1974, p. 247).

In an experiment with very young children (1½ to 3 years old), Wilcox and Palermo (1974) had three conditions in which subjects placed moveable objects in relation to stationary ones. In one, the instructions were congruent with the natural relations between the objects; in the second, the instructions were incongruent with the natural relations (a teapot in a table, a boat on a bridge, and a road in a truck); in the third condition there were no contextually determined relationships between the objects, and all three prepositions were given as instructions.

They found that, when normal contextual constraints are violated in the instructions (condition two), 1½ - 2 year olds simply make the simplest motor response available, but 2 - 3½ year olds respond by placing objects in their natural relationships to one another, no matter what preposition is used in the instruction. When everyday contextual constraints are neutralized (as in the third condition), there is no more tendency to equate on with in as there is the opposite tendency. Hence, Wilcox and Palermo demonstrated that almost any pattern of errors can be obtained through the simple manipulation of the contextual constraints of the task.

Thus, as with words in syntactic contexts, children's responses to words in reference contexts may be due in part to interpretations of the words and in part to interpretations of the context. In Clark's (1973a) experiment with the locatives in, on, and under, the children's interpretation errors, and the apparent order of acquisition which they support, appear to have been largely determined by the nonlinguistic context. There is thus no outstanding evidence that the acquisition of these terms supports the relative complexity assumption.

Comparative Adjectives: Same-Different

The notion of words interacting with their linguistic and nonlinguistic context brings us to the next topic, namely, the alleged sameness of the comparatives same and different. Donaldson and Wales (1970) reported the

original finding for 3½-year-old children. Given a choice of objects and instructed to (a) "give me one that is the same in some way" and (b) "give me one that is different in some way," children respond to the two requests in the same way, namely, by handing the experimenter the object which is most identical to the standard. This result occurred with both types of array used by Donaldson and Wales (1970). In one type, all instances of each class of objects (e.g., toothbrushes) were identical in every respect; in the other, each instance of the same class of objects was a different color, with no colors the same across different classes. Clark (1973b) and many others have interpreted this to mean that children have acquired the semantics of the unmarked same and treat the marked different as if it were synonymous in keeping with a major assumption of Clark's theory. However, if we examine the several senses of the term different, we see that interpreting children's responses as being either correct or incorrect is extremely difficult. Objects may be different because (a) they belong to distinct classes of objects (e.g., cars, balls, cups, trees, etc.) and differ on all characterizing attributes, (b) they belong to the same class of objects but differ on one or more characterizing attribute(s) (e.g., blue cars vs. yellow cars, large cars vs. small cars, etc.), or (c) they are identical in every way but are simply distinguishable instances of the set of identical objects, of which there are as many different instances as the set has cardinality (e.g., one large blue car, and a different--i.e., another--large blue car).

Donaldson & Wales (1970) suggest that different is first acquired in either its second or third senses (b or c above), hence a request for an object which is "different in some way" from another will result in the selection of a member of the same class of objects. However, the instruction "different in some way" presupposes that the requested object is also similar in some way. Hence, it is not likely that subjects would choose an object which both belongs to a different class and has no physical attributes in common with the standard. In other words, something must be common to two objects for them to be different, and in Donaldson & Wales' (1970) study, the only possible source of this commonality was class membership. The stimulus materials were not constructed with the provision that "same in some way" could mean (d) same with respect to common attributes (e.g., color) but different with respect to class of object (e.g., a blue car and a blue ball). It would seem, then, that a fourth sense of different was neglected, and that this omission imposed definite limitations upon how the child could interpret the meaning of different.

Using younger subjects (2;9 - 3;11) than Donaldson & Wales', Webb, Oliveri, & O'Keeffe (1974) replicated their finding with the original arrays, then added new conditions which provided choices which were consonant with all four senses of different on different trials. In two replications of these conditions with different subject samples, over half the children followed the Donaldson & Wales (1970) response pattern, interpreting different in the sense of c above. The remaining children either responded correctly (according to senses b or d above) or were inconsistent between the correct and the Donaldson & Wales' response patterns. Finally, 18 adult subjects performed the task; of these, 10 responded to different in the sense of a above, one responded in the sense of c, and the remaining seven tended to

respond according to senses b or d. In other words, the fully mature pattern of interpretation of the single lexical term different in the context of the instruction "hand me one which is different from this one" was ambiguous, given the range of possible interpretations available to the subject on any one trial. Is it correct, then, to interpret any type of response on this task as indicating a failure to distinguish different from same? Given that the four legitimate senses of different listed above cover all four possible response options on the experimental task, and given that three of these senses require that the items either be the same in some way (i.e., same class of item with different attributes, or different class with same attributes), or identical in every way, is it logically possible to draw any conclusions about same and different on the basis of this task? It would appear not to be.

Glucksberg, Hay, and Danks (1976) sought to alter this procedure so as to avoid the inherent ambiguity of different. They constructed arrays which allowed for responses of either type a, b, or c, and presented these along with same-different instructions to 2;8 - 3;3 year old children. The results replicated Donaldson & Wales' (1970): 78% of the responses to different were type c. In a similar task using adult subjects, Gluckberg, et al. discovered that adults also respond to "give me one that is different from this one" by handing the experimenter the most identical object available. In both conversational and formal experimental contexts, these investigators found that adults interpret that instruction exactly as the children do--as a request for another instance of the same class of objects as the standard shown. Does this mean that adults confuse different with same?

In a second task, the same children were to respond to a specific dimension of difference. The child and the experimenter worked together constructing chains of pop beads which were of several different colors. The experimenter would ask the child to "give me one that is the same color as this bead," or "give me one that is a different color than this bead." The same children who had previously failed to distinguish same from different in the Donaldson & Wales (1970) procedure, all performed correctly on the second task, choosing a bead of identical color to the same instruction, and of different color to the different instruction.

Glucksberg, et al. concluded that, rather than having failed to acquire a discrete distinction between same and different, the children in their study were apparently following rather sophisticated conventions of conversational discourse when responding to the Donaldson & Wales procedure. The authors caution against interpreting responses to words in utterance contexts (e.g., "give me one which is same/different in some way") as if the words alone were being tested. They note that, in normal adult conversation, many utterances containing different and contrasting words are in fact responded to in the same way. Thus, if on one occasion I say to you, "Do you like all this rain?" and you respond, "No, I do not," and on another occasion I say to you, "Don't you like all this rain?" and you respond, "No, I do not," should I infer from the sameness of your responses that you do not differentiate do from don't? The answer is of course, that I cannot. Glucksberg, et al. have demonstrated that such inferences are not appropriate and that, if asked the question differently, even very young children correctly differentiate same from different.

Comparative Adjectives: More-Less

Among comparatives, no pair of terms has received more attention than more and less. On the basis of considerable research, especially by Donaldson & Balfour (1968), Donaldson & Wales (1970), and Palermo and his associates (Palermo, 1973, 1974; Holland & Palermo, 1975), it is commonly accepted that 3-year-olds treat less as if it meant more. Asked which of two quantities is less, the child typically indicates the one with more. Asked to make a quantity less, the child typically increases it. The finding has been verified that both discrete (Donaldson & Balfour, 1968; Donaldson & Wales, 1970; Palermo, 1973, 1974) and continuous (Palermo, 1973, 1974) substances--in the latter case with the volume of water in a pitcher or glass--and also with weights and linear arrays of unequal number (Palermo, 1974).

In a different type of task, Harasym, Boersma, and Maguire (1971) and Palermo (1974) reported that, prior to about age seven or eight, children do not differentiate between more and less when asked a series of semantic differential type questions about the two concepts (that is, is more/less big or small, high or low, long or short, wide or narrow, fat or thin, and up or down--each on an orally administered five-point scale). Of course, it is possible that the ability to differentiate more from less on such scales correlates with age not because of increasing differentiation of the meanings of these two terms, but because of improving ability to make scaled verbal responses of the type required in these investigations. No semantic differential data are reported for other antonym pairs, so it is not known whether other, already acquired antonyms are correctly differentiated on the semantic differential scales whereas more and less are not.

Clark (1973b) cites the less-is-more phenomenon as evidence for the marked/unmarked asymmetry of acquisition, since more and less are taken as examples of a marked/unmarked antonym pair (but see Townsend [1976], who concludes that these terms are nonexemplars of linguistic marking). Most recently, however, several investigators have questioned whether this consistent finding of lack of differentiation of less from more is the result of procedural artifacts in the comprehension tasks in which understanding of these terms is assessed. Holland & Palermo (1975) seemed to anticipate subsequent findings when they questioned the rapid and reliable improvement of 4- to 6-year-olds in correctly interpreting less following only a single training instruction. The investigators were attempting to train children who showed the less-is-more confusion to establish whether improvement due to linguistic training generalized to improved performance in volume and number conservation tasks. To their surprise, training had immediate and and irreversible effects on the less-is-more confusion. "The crucial heuristic responsible for the child's insight seemed to be the initial situation . . . in which a statement specifying the 'more'-'less' opposition ('one has more; the other has less') was spoken in view of an unequal-quantities situation" (Holland & Palermo, 1975, p. 441).

That is, once the child was informed of the oppositeness of the two terms, one quantity being more, the other being less, completely accurate responding ensued. The authors conclude that such rapid improvement suggests " . . . that the 'less'-'more' confusion is a relatively superficial problem . . . and may even be an instance of response bias rather than a conceptual difficulty." They then elaborate that, if the phenomenon is due to response bias, " . . . then the child being tested perceives the more extended quantity as the desired, expected, or somehow better choice regardless of verbal instructions" (Holland & Palermo, 1975, p. 442).

Carey (Note 1) attempted to locate the source of the child's errors with less in the typical unequal-quantities comprehension task. She performed several experiments which followed the usual paradigm except that nonsense syllables were substituted for the lexical items more/less in the instructions. Initially she gave a nonlinguistic task in which her 3- and 4-year-old subjects made adjustments of volume of water in a glass to match the level indicated by the gestures of a "fussy puppet." While all subjects correctly added water when necessary, only 27% of 3-year-olds and 60% of 4-year-olds correctly poured out water when necessary to match the puppet's level, indicating a definite response bias (especially in the 3-year-old) in favor of adding and against subtracting quantity in this typical test situation. Carey then gave a linguistic task in which the child performed addition or subtraction to consecutive instructions containing first a nonsense syllable (e.g., "Make it so I have tiv tea in here"), then more and less (in balanced order), then again the nonsense syllable. Carey identified five primary patterns of response to the four instructions: (1) 41% of 3-year-olds and 21% of 4-year-olds responded to all four instructions in identical fashion (e.g., adding to all), indicating a response bias which is indiscriminate; (2) 11% of 3-year-olds and 42% of 4-year-olds followed the adult pattern of correct responses to more and less and questioned the meaning of the nonsense syllable; (3) 15% of 3-year-olds and 8% of 4-year-olds added to more but responded in identical fashion to less and both nonsense syllables, indicating no entry for less in the child's lexicon; (4) 14% of 3-year-olds and 16% of 4-year-olds added to more, poured out to less, and either added or subtracted to nonsense syllable, indicating a response bias on the nonsense syllables; and (5) 15% of 3-year-olds and 13% of 4-year-olds questioned the first nonsense syllable, then added to the remaining three instructions, including the final nonsense syllable, indicating a response bias to add after the initial question. Thus, correct responding to more was the norm, while the responses to less and the nonsense syllable were only differentiated by those subjects showing completely adultlike responses. The rest simply treated less as if it were a nonsense syllable. Not one of 65 children treated the nonsense syllable and less differently and also treated less as if it meant more. It appears that the lexical entry for less and the nonsense entry in the instructions are interchangeable for determining the child's response (unless the meaning of less is completely acquired). In other words, it is incorrect to locate the source of the child's errors with a single lexical entry in the instructions--namely, with the meaning of less. It is more likely that a response bias toward adding, rather than the lexical entry for less, is what makes less appear to mean more in the child's interpretive responses. Substitute a nonsense syllable for less and the behavior is the same. The assertion that less is interpreted to mean more at some point in development is therefore not supported.

Interestingly, Carey performed a second version of her experiment, in which the operations of addition and subtraction of water were both accomplished by the same mechanical response. Even under these conditions, the children's dominant response was to add water to both less and nonsense syllable instructions. Wilcox & Palermo (Note 4) recently replicated Carey's findings, using discrete objects rather than continuous water volume as the reference materials.

To elucidate how children interpret the meaning of more and less in the typical experimental task, Weiner (1974) analyzed two senses of more,

one being the comparative quantity sense we have been discussing, the other being the "recurrence" sense, as in the utterance "Here is one rack of dresses, and there are more dresses on that rack over there." Here, more means other (i.e., new) instances, rather than a larger quantity. Weiner noted that, in early experiments in which more was correctly interpreted (Mehler & Bever, 1967; Bever, Mehler, & Epstein, 1968), the child merely had to indicate the row that was added to in order to make a correct response (Beilin, 1968). Further, studies in which children judge which of two static rows has more do not always agree with those in which children judge more when the adding transformation is applied. Weiner concludes that one cannot separate the recurrence from the comparative sense of more on the basis of available data. This is because the act of addition results in both recurrent new instances being brought into view and a greater amount resulting as the final state, so that correct more could apply in either sense.[3] Weiner attempted to separate the two senses of more (and less) by counterbalancing the acts of addition and subtraction by the experimenter with the outcomes of these transformations (being either "more" or "less") relative to a comparison row. Half of the addition transformations produced more objects and half produced fewer objects than the comparison row, and similarly for subtraction.

Weiner found that the overwhelming majority of subjects at any age showed no tendency to treat less as if it meant more. In response to less questions, there was no tendency to choose the row added to more often than the row subtracted from, nor to choose the row with the greater final quantity more often than that with the lesser final quantity. (This result coincides with Griffith, Shantz, & Siegel's [1967] finding that less is not confused with more in children's productions).

In only one experimental condition--when addition always resulted in a greater quantity--did any of Weiner's subjects perform worse than chance in response to less. However, for these subjects (who were 2 to 3½ years old), an equal tendency to do worse than chance with more existed when subtraction always resulted in a lesser quantity. That is, under these conditions, there was as much tendency to choose the row subtracted from in response to more as there was to choose the row added to in response to less. Both outcomes demonstrate a strong tendency on the part of the youngest subjects to simply choose the transformed row in response to either question. When the transformations of adding and subtracting led to different comparative outcomes, the youngest subjects demonstrated a response bias toward choosing the row added to in response to more questions, regardless of the comparative outcome of addition.

Weiner also reported that the order in which more and less questions are asked in consecutive test sessions significantly influences children's behavior. She notes that the original Donaldson & Balfour (1968) procedure presented all more questions on the first day of testing and all less questions on the second day, possibly contributing to a bias toward addition in response to less, since addition had been correct the day before with more.

The total pattern of results from Weiner's study does suggest that correct comprehension of more precedes correct comprehension of less developmentally, which agrees with Carey's (Note 1) results. This could explain

why Holland & Palermo (1975) observed such rapid improvement with less following their training instruction. The effect of informing the child that one of two unequal quantities is more while the other is less is to draw attention to the oppositional nature of the two terms. If more is already understood, then informing the child that less means the opposite will ensure that less is correctly interpreted (i.e., as meaning "not more")?

What Carey (Note 1), Wilcox & Palermo (Note 4), and Weiner (1974) have demonstrated is that previous comprehension studies with more and less have confounded children's response biases which are specific to the task with their linguistic understanding of the lexical terms in question. While more does appear to be acquired earlier than less, these studies do not justify the assertion that there is a developmental period during which the term less is systematically interpreted as having the meaning of its antonym.[4]

Spatial relation terms

The theoretical assumption that positive terms are acquired prior to negative ones was extended by Clark (1973b) to the case of the relational antonyms in front and behind (or in back). It is argued (E. Clark, 1973b; H. Clark, 1973) that the terms are asymmetric, front being positive because it refers to a location within the field of vision (particularly if the reference axis centers on the speaker, e.g., "in front of me") while behind is negative, referring to "not within the field of vision" (E. Clark, 1973b, p. 106). The acquisition of front, back, and side is interesting from the perceptual standpoint because of the obvious dependency of interpretation of these terms upon perceptual knowledge about space, its axes, and relationships on these axes. From the linguistic standpoint, these terms comprise the only deictic system which intersects with a nondeictic system of spatial reference. For objects that have natural or conventionally agreed-up "fronts," such as people, animals, vehicles, houses, most pieces of furniture, appliances, and so forth, the use and interpretation of front and back (or in front of-behind) is nondeictic: There is no dependency of reference upon the orientation and distance of the referent with respect to the speaker and/or listener. The front-back location is determined absolutely by the object's agreed-upon front side. However, for nonfronted objects, such as glasses, tables, boxes, doors, etc., the use of these terms is deictic, depending upon the speaker and/or listener's location with respect to the referent. For example, without being moved, the same umbrella may be described as having been deposited either in front of the door or behind it, depending upon which side of the door the observer is on at the time of the utterance. Adults appear to interpret in front of nonfronted objects as meaning some point in the space between themselves and the objects, and behind or in back of the object as being the side opposite from that (Kuczaj & Maratsos, 1975). Then there is the special case of reference to the front and back of oneself, wherein these locations are specified by one's own front and back sides.

Side is generally agreed to be even more complex (hence acquired later) than either front or back (H. Clark, 1973; Kuczaj & Maratsos, 1975). For one thing, side presupposes knowledge of the other two terms, referring as it does to that axis which is not the front/back axis of the object (H. Clark, 1973). For another, side is said to presuppose two perceptual-semantic dimensions, relative horizontal distance from the observer and differential

direction from some point along the distance dimension (H. Clark, 1973), whereas in front of and in back of presuppose only the former.

Investigators have generally included all three types of reference systems (self-referent, fronted objects, and nonfronted or featureless objects) in assessing children's understanding of front, back, and side. They have instructed children to place both fronted and nonfronted objects with respect to themselves and to other objects of both types (Harris & Strommen, 1972; Kuczaj & Maratsos, 1975; Tanz, 1976). When making the placement with respect to a nonfronted object, an accurate response requires the subject to use his own location and orientation vis-a-vis the object as a deictic reference point, as adults are presumed to do (Kuczaj & Maratsos, 1975; Tanz, 1976). Kuczaj & Maratsos included, in addition to nonfronted objects, two instruments which could have multiple fronts (as suggested by multiple knobs, gadgets, and openings). The child was expected to define the front as that side which he had faced earlier when playing with the instrument.

All three studies agree that children are more accurate in their front and back placements with respect first to themselves and, after that, with respect to fronted as compared to nonfronted objects. The child apparently acquires the notion of frontedness as defined by physical features of objects (e.g., faces, knobs, etc.) prior to the deictic sense of front as defined by distance and location from self. But, as regards the Clark's assertion that front should be acquired prior to back, these studies appear to disagree. In trials with nonfronted objects, the children in these studies (ranging from under 3 to 7.6 years old) generally made front/back placements correctly with respect to the cardinal direction toward-away from self. However, neither Harris & Strommen (1972) nor Kuczaj and Maratsos (1975) found evidence for the asymmetric acquisition of front and back. Regardless of the correctness of their placements, these children always respected the oppositeness of the two terms. No subject consistently responded to back as if it meant front (making both front and back placements to the front), nor did front appear to be acquired earlier than back. Children apparently acquire the proper axis of reference as well as the notion of oppositeness on this axis prior to acquiring the individual meanings of the terms themselves. Kuczaj and Maratsos reported, in addition, that once one term began to be correctly interpreted, so did the other, suggesting the near simultaneous acquisition of both terms.

Unfortunately, both Kuczaj and Maratsos and Harris and Strommen employed a methodology which presupposes the oppositeness of these terms, possibly predisposing the children to respond to them in an alternate or opposite manner. Both investigations gave all three instructions (front/back/side) with the same reference object in random order, but over consecutive trials. Thus, once the child had responded to one instruction (e.g., front) by placing the moveable object with respect to the fixed one, he was immediately given another instruction (e.g., back) with the same fixed object, and finally given a third (e.g., side) before presentation of the next fixed object. The implicit demand on the subject would seem to be to make a different placement each time, and making the opposite placement is a logical choice. Placing objects on the side on a left-right axis did appear later than placing in front and back on a toward-away from axis among younger subjects (this disparity did not appear among Harris and

Strommen's subjects, who were several years older). This could be interpreted as support for the assumption that relatively more complex terms are acquired later than relatively simpler ones, given the semantic analysis of side proposed by H. Clark (1973). But the critical design constraint already described renders it impossible to test the hypothesis that front is acquired earlier and back is systematically confused with front. All three effects--the interpretation of front-back as opposites prior to their accurate individual interpretation, the lack of an accuracy bias for either term, and the near simultaneous acquisition of both terms--could be an artifact of the consecutive presentation of instructions.[5]

Tanz (1976) avoided the consecutive presentation of opposites problem by randomly presenting the different reference objects on single trials, each time with a single instruction. Multiple trials with the same reference object were randomly interspersed with trials for other objects, each time with only a single one of the front/back/side instructions given. With this design, she found that correct interpretation of front lags significantly behind correct interpretation of back. Not a single one of the youngest children (aged 2½ - 4 years) made more in back of than in front of errors, while the majority made more errors in the opposite direction. Beyond age four, almost no errors of either type occurred. Thus, with the design artifacts reduced, the acquisition of front and back appears to be asymmetric, but in the opposite direction as that proposed by the Clarks.

It is, of course, quite possible to revise the semantic analysis of front and back in light of Tanz's result: Back might be interpreted as being perceptually or deictically less complex or higher in some feature hierarchy, than front. This could bring Tanz's finding into line with the relative complexity hypothesis. For example, for fronted objects, there is a potential conflict between the deictic and the absolute interpretations of front, such that a child could choose either the front of the object or the space between himself and the object (i.e., "in front of me") when these locations are in conflict. There is no similar ambiguity between the back of the object and "in back of me," since the latter option requires placement behind the child's own body, totally removed from any proximity to the fixed object itself. Thus, in back of entails less potential ambiguity between the absolute and the deictic senses, and could therefore be the simpler term.

However, such an analysis merely begs the question. One may explain a particular finding in certain theoretical terms (e.g., relative semantic complexity) by fitting the terms to the finding. But this is not to be confused with a test of the predictions of the theory. One of the difficulties (as well as one of the advantages) of the relative complexity hypothesis is that relative complexity is such an open and flexible concept. It is possible to take any set of lexical terms and propose an ad-hoc semantic analysis of them which ascribes more features, more general features, or positive vs. negative features, etc. to one as opposed to the other. But until the validity of the semantic analysis is empirically established it remains purely speculative. When we have a sound scientific basis for attributing certain semantic features to some terms and not to others, ascribing greater semantic complexity to some terms relative to others, or attributing positiveness to some terms and negativeness to others, then the

various assumptions of Clark's theory may be truly subject to test. Until such time, the theory provides a cohesive framework for understanding seemingly disparate findings, but the evidence will fall short of sound scientific confirmation.

Deictic Verbs

Clark & Garnica (1974) investigated the acquisition of the verbs come-go and their causative counterparts bring-take. According to Fillmore (1966, 1971), these verbs presuppose specific information about the location of the speaker and the listener at the time of the utterance or a time identified in the sentence. A supposition of go is always that the speaker is not now located at the goal of the motion (as in I am going to the party) --conditions which make go semantically negative, according to Clark & Garnica (1974). One supposition of come is that either the speaker or the listener is presently located at the goal of the motion; thus, the sentence When did you come to the party? supposes that the speaker is presently at the party to which the listener has come. I have come to the party supposes the listener is at the party to which the speaker has come. In the third person, past or future tense, the supposition of come is that either the speaker or the listener or both are at the goal at the time of the motion. Clark & Garnica (1974) attribute positiveness to come because these conditions are all positive. Bring and take are thought to be formally equivalent to come and go with the addition of the feature +Causative.

In Clark and Garnica's experiment, children between six and nine years of age were tested for comprehension of the verbs by answering questions about which of three toy animals situated at various goal points on a board could logically have been either the speaker or the addressee of sentences containing come or go, bring or take. The problem for the child was to recognize that, whenever come or bring was used, either the speaker or the addressee had to be at the goal mentioned; contrastively, whenever go or take was used, neither speaker nor addressee could be located at the goal.

Clark and Garnica found that performance with the negative go and take improved progressively over the ages represented, increasing from about 25% correct for 6-year-olds to 70-80% correct for 9-year-olds. Performance with come and bring was around 75-85% correct at all ages. Further, performance with bring and take lagged somewhat behind that for come and go. These results are compatible with predictions from Clark's theory that positive terms precede negative ones and more complex terms precede simpler ones in acquisition.

Richards (1976) argues that the Clark and Garnica task requires considerable cognitive maturity, and probably becomes an exercise in perspective-taking for the child. Performance may depend not so much upon linguistic competence as upon the child's cognitive ability to conceptualize the communication context to which the verbs refer in the task. Thus, the rather complex "strategies" which Clark and Garnica's subjects appeared to adopt may not reflect interpretation strategies at different developmental stages, as the investigators maintain, but instead may be coping strategies for responding to an overly demanding task.

To avoid such demands, Richards (1976) placed 4- to 7½-year-olds into carefully contrived and controlled play situations in which the production of come or go, bring or take was necessary to complete games in which the child was ego-involved. Use of the verbs could be scored for semantic correctness according to the exact deictic situation in which they occurred.

The results departed in several major ways from those of Clark & Garnica (1974). First, acquisition of both come and go was virtually complete by age four. Performance with bring and take (especially the latter term) exceeded that of the much older children in Clark and Garnica's study. A second departure is in the developmental picture which emerged with bring and take. There was no evidence of the interpretation strategies Clark and Garnica identify with the acquisition process. From the proportion of overall usage and the percentage of correct usage data, Richards traced the following development stages:

The youngest children had acquired bring as a functioning term in their productive repertoires, but its meaning was over-general, applying also to situations requiring take. Four-year-olds used bring on 70% of all trials; they used bring correctly on 73% of all "bring" trials, but also produced bring on 68% of all "take" trials. Five-year-olds, on the other hand, had clearly incorporated take into the repertoire: they used take about 50% of the time. But for them, both take and bring were used indiscriminantly--take invading the "bring" situations about as often as bring invaded the "take" situations (resulting in 50% correct use of both verbs). Apparently, a random choice between the verbs was made on most trials. Six-year-olds had correctly mapped bring onto the appropriate situational parameters, but they continued to choose randomly between the verbs in "take" situations. Thus, bring was used correctly 68% of the time in "bring" situations, but both verbs were used 50% of the time in "take" situations. Finally, at seven, the connection between each verb and its deictic reference was well-established: correct use of each verb was around 80%.

While the initial stage does resemble the overextension of an earlier acquired term to cover meaning situations appropriate to its antonym, the subsequent stage substantially alters the ontogenetic picture. As take takes hold in the lexicon, bring does lose its former generality (i.e., it is no longer overextended). However, bring also loses its accuracy: semantically appropriate usage drops to chance level, and both terms invade contexts appropriate to the other. This suggests that the initial overextension of bring was not based upon correct understanding of the meaning of that term, as the overextension assumption requires, but that it was simply the more favored term to use in either deictic situation.

While the come-go pair does appear to be acquired earlier, Richards (1976) argues that this may be due less to the addition of the +Causative feature than to the prevalence of a great many competing nondeictic senses of bring and take in the English language. Also, there are numerous communication situations in which the discriminative use of bring or take depends not upon physical parameters of location, time, and direction or movement, but upon the psychological perspective adopted by the speaker. There are thus substantial linguistic differences between the pairs which are perhaps more compelling than their relative semantic complexity, and which might contribute to the later acquisition of bring and take.

In a nonexperimental study of the production of come-go and bring-take, Keller-Cohen (Note 2) recorded spontaneous utterances of these terms by 18 Black 3-year-olds during unstructured play with toy people and a doll house. She recorded a higher frequency of deictic use of go as compared to come and take as compared to bring--exactly the reverse of the order of acquisition reported by Clark & Garnica (1974) and by Richards (1976). There may be dialect differences in Keller-Cohen's sample which could account for the disagreement, and her children were also much younger than those employed in either study. However, Keller-Cohen cites other records of early spontaneous speech (Ames & Learned, 1948; Bateman, 1914, 1915; Harwood, 1951) in which go and take occur earlier, more frequently, and in more varied syntactic contexts than their respective opposites. (What we do not know from these studies is the proportion of such usage which was actually deictic. With go, for example, the present tense is used frequently as a substitute for other, more specific, motion verbs, such as runs, moves, turns, operates, and works, e.g., "It goes fast!", "It goes round and round," etc. It even substitutes for an occasional static verb, such as fits, belongs, and is oriented, e.g., "That piece goes right here," "This picture goes this way," etc. Go serves accurately as an all purpose verb for young children who have not yet acquired the more specific verbs.

Richards' (1976) data indicate that come and go are correctly used by age four. At a younger age, Keller-Cohen's data suggest that go rather than come, and take rather than bring, are the preferred terms of usage. This requires further, careful investigation. However, if it is true, then this order of acquisition would conflict with predictions from Clark's theory.

Summary

Evidence bearing on the three major ontogenetic assumptions of Clark's (e.g., 1973b) semantic feature theory of the acquisition of word meaning has been reviewed. The only assumption which has received consistent support is the top-to-bottom assumption: In an hierarchically organized lexical domain, the order of acquisition appears to be from the top of the hierarchy downward. Confirmation for this assumption has thus far been limited to the domain of dimensional adjectives of spatial reference. Terms having more specific dimensions of reference appear to be acquired later than those having fewer specific reference dimensions.

The second assumption is that linguistically unmarked or semantically positive terms are acquired before their marked or negative counterparts. Certain dimensional adjectives (e.g., long-short, wide-narrow, etc.) appear to confrom to this order of acquisition. With the comparatives more and less, comprehension of the unmarked more is frequently (although not consistently) found to exceed comprehension of the marked less, again in accordance with Clark's theory. But for other terms which have been reported to conform to the order of acquisition under Clark's second assumption, subsequent investigations have not supported this claim. Review of recent studies of the acquisition of terms of temporal reference (before-after, first-last), spatial relationships (front/back/side), location (in, on, under),

comparison (same-different) and deictic motion verbs (come-go, bring-take) has indicated that either no asymmetry exists, or it is in the opposite direction at some stage of acquisition.

Evidence Clark interprets as supporting her second assumption is frequently taken from studies in which comprehension has been confounded with the behavioral tendencies of young children in comprehension tasks. Investigators have reported consistent nonlinguistic predispositions to respond in certain fixed ways; in most cases, the response bias favors correct responding to the unmarked or positive terms. Children's difficulties with these terms are also often attributable to nonsemantic factors--the effects of the syntactic, communication, or nonlinguistic context of the instructions.

The third major assumption of Clark's theory has probably aroused the most controversy and inspired the most consistent counterevidence. In virtually every reported case of systematic misinterpretation of the marked or negative term as having the meaning of the unmarked or positive term, subsequent research has failed to support this conclusion. In some instances, the control of procedural artifacts in the experimental task substantially reduces or eliminates the confusion. In others, confusion appear to be bidirectional, or occur in different directions at different developmental stages.

A review of the current literature on the acquisition of English antonyms reveals a field of investigation in need of further improvements in research methodology. Investigators should exercise extreme caution in locating the source of children's errors in experimental tasks directly with la langue--distinguishing this from la parole have never been more difficult than in the study of children's language.

REFERENCES

Ames, L. B. & Learned, J. The development of verbalized space in the young child. Journal of Genetic Psychology, 1948, 72, 63-84.

Amidon, A. & Carey, P. Why five-year-olds cannot understand before and after. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 417-423.

Barrie-Blackley, S. Six-year-old children's understanding of sentences adjoined with time adverbs. Journal of Psycholinguistic Research, 1973, 2, 153-165.

Bateman, W. G. A child's progress in speech, with detailed vocabularies. Journal of Educational Psychology, 1914, 6, 307-320.

Bateman, W. G. Two children's progress in speech. Journal of Educational Psychology, 1915, 7, 475-493.

Beilin, H. Cognitive capacities of young children: A replication. Science, 1968, 162, 920-921.

Bever, T. G. The comprehension and memory of sentences with temporal relations. In G. B. Flores d'Arcais & W. J. M. Levelt (Eds.), Advances in psycholinguistics. Amsterdam: North-Holland, 1970, 285-293. (a)

Bever, T. G. The cognitive basis for linguistic structures. In J. R. Hayes (Ed.), Cognition and the development of language. New York: Wiley, 1970, 298-311. (b)

Bever, T. G., Mehler, J., & Epstein, J. What children do in spite of what they know. Science, 1968, 162, 921-924.

Bierwisch, M. Some semantic universals of German adjectivals. Foundations of Language, 1967, 3, 1-36.

Bierwisch, M. On certain Problems of semantic representations. Foundations of Language, 1969, 5, 153-184.

Bierwisch, M. On classifying semantic features. In D. D. Steinberg & L. A. Jakobovits (Eds.) Semantics: An interdisciplinary reader in philosophy, linguistics, and psychology. London: Cambridge University Press, 1971, 410-435.

Bloom, L. Language development: Form and function in emerging grammars. Cambridge, Massachusetts: M.I.T. Press, 1970.

Bloom, L. One word at a time: The use of single word utterances before syntax. The Hague: Mouton, 1973.

Brewer, W. & Stone, J. B. Acquisition of spatial antonym pairs. Journal of Experimental Child Psychology, 1975, 19, 299-307.

Clark, E. V. How young children describe events in time. In G. B. Flores d'Arcais & W. J. M. Levelt (Eds.) Advances in psycholinguistics. Amsterdam: North-Holland, 1970, 275-293.

Clark, E. V. On the acquisition of the meaning of before and after. Journal of Verbal Learning and Verbal Behavior, 1971, 10, 266-275.

Clark, E. V. On the child's acquisition of antonyms in two semantic fields. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 750-758.

Clark, E. V. Non-linguistic strategies and the acquisition of word meaning. Cognition, 1973, 2, 161-182. (a)

Clark, E. V. What's in a word? On the child's acquisition of semantics in his first language. In Moore, T. Cognitive development and the acquisition of language. New York: Academic Press, 1973, 65-110. (b)

Clark, E. V. & Garnica, O. K. Is he coming or going? On the acquisition of deictic verbs. Journal of Verbal Learning and Verbal Behavior, 1974, 13, 559-572. (See Erratum, 1975, 14, 122.)

Clark, H. H. Space, time, semantics and the child. In Moore, T. Cognitive development and the acquisition of language. New York: Academic Press, 1973, 27-63.

Cromer, R. F. Development of temporal reference during the acquisition of language. Unpublished Ph.D. dissertation, Harvard University, 1968.

Donaldson, M. & Balfour, G. Less is more: A study of language comprehension in children. British Journal of Psychology, 1968, 59, 461-471.

Donaldson, M. & Wales, R. J. On the acquisition of some relational terms. In J. R. Hayes (Ed.) Cognition and the development of language. New York: Wiley, 1970, 235-268.

Eilers, R. E., Oller, D. K., & Ellington, J. The acquisition of word-meaning for dimensional adjectives: The long and short of it. Journal of Child Language, 1974, 1, 195-204.

Ferreiro, E. & Sinclaire, H. Temporal relationships in language. International Journal of Psychology, 1971, 6, 39-47.

Fillmore, C. J. Deictic categories in the semantics of come. Foundations of Language, 1966, 2, 219-227.

Fillmore, C. J. Lectures on deixis. Unpublished manuscript, Summer Program in Linguistics, University of California at Santa Cruz, 1971. (Available from Indiana Linguistics Club, Indiana University, Bloomington, Indiana.)

Glucksberg, S., Hay, A., & Danks, J. H. Words in utterance contexts: Young children do not confuse the meanings of Same and Different. Child Development, 1976, 47, 737-741.

Griffiths, J. A., Shantz, C. A., & Siegel, I. E. A methodological problem in conservation studies: The use of relational terms. Child Development, 1967, 38, 841-848.

Harasym, C. R., Boersma, F. J., & Maguire, T. O. Semantic differential analysis of relational terms used in conservation. Child Development, 1971, 42, 767-779.

Harris, L. J. & Strommen, E. A. The role of front-back features in children's "front," "back," and "beside" placements of objects. Merrill-Palmer Quarterly, 1972, 18, 259-271.

Harwood, F. W. Quantitative study of the syntax of the speech of Australian children. Language and Speech, 1951, 2, 236-271.

Holland, V. M. & Palermo, D. S. On learning "less": Language and cognitive development. Child Development, 1975, 46, 437-443.

Katz, J. J. & Fodor, J. A. The structure of a semantic theory. In J. A. Fodor & J. J. Katz, The structure of language. Englewood Cliffs, N. J.: Prentice-Hall, 1964, 479-518.

Klatzky, R. L., Clark, E. V., & Macken, M. Asymmetries in the acquisition of polar adjectives: Linguistic or conceptual? Journal of Experimental Child Psychology, 1973, 16, 32-46.

Kuczaj II, S. A. & Maratsos, M. P. On the acquisition of front, back, and side. Child Development, 1975, 46, 202-210.

Lumsden, E. A. & Poteat, B. The salience of the verbal dimension in the concept of "bigger" in 5 and 6 year olds. Journal of Verbal Learning and Verbal Behavior, 1968, 7, 404-408.

Maratsos, M. P. Decrease in the understanding of the word "big" in preschool children. Child Development, 1973, 44, 747-752.

Mehler, J. & Bever, T. G. Cognitive capacities of very young children. Science, 1967, 158, 141-142.

Osgood, C. E., Suci, G., & Tannenbaum, P. The measurement of meaning. Urbana, Illinois: University of Illinois Press, 1957.

Osgood, C. E. Speculation on the structure of interpersonal intentions. Behavioral Science, 1970, 15, 237-254. (a)

Osgood, C. E. Interpersonal verbs and interpersonal behavior. In J. L. Cowan (Ed.) Studies in Thought and Language. Tucson, Arizona: University of Arizona Press, 1970, 133-228. (b)

Osgood, C. E., May, W., & Miron, M. Cross-Cultural Universals of Affective Meaning. Urbana, Illinois: University of Illinois Press, 1975.

Palermo, D. S. More about less: A study of language comprehension. Journal of Verbal Learning and Verbal Behavior, 1973, 12, 211-221.

Palermo, D. S. Still more about the comprehension of "less." Developmental Psychology, 1974, 10, 827-829.

Piaget, J. The development of time concepts in the child. In R. H. Hoch & J. Zubin, (Eds.), Psychopathology of childhood, New York: Grune & Stratton, 1955.

Piaget, J. Six psychological studies, edited by D. Elkind. New York: Random House, 1967.

Piaget, J. The child's conception of time, translated by A. J. Pomerans. New York: Balantine Books, 1971. (Original French edition, 1927.)

Piaget, J. & Szeminska, A. The child's conception of number, translated by C. Gattegno & F. M. Hodgson. New York: Humanities Press, 1952. (Original French edition, 1941.)

Richards, M. M. Come and go reconsidered: Children's use of deictic verbs in contrived stituations. Journal of Verbal Learning and Verbal Behavior, 1976, 15, 655-665.

Smith, K. & McMahon, L. Understanding order information in sentences: Some recent work at Bell Laboratories. In G. B. Flores d'Arcais & W. J. M. Levelt (Eds.), Advances in psycholinguistics. Amsterdam: North-Holland, 1970, 253-274.

Tanz, C. Acquisition of deictic expressions. Unpublished Ph.D. dissertation, University of Illinois at Urbana-Champaign, 1976.

Townsend, D. J. Children's comprehension of comparative forms. Journal of Experimental Child Psychology, 1974, 18, 293-303.

Townsend, D. J. Do children interpret "marked" comparative adjectives as their opposites? Journal of Child Language, 1976, 3, 385-396.

Townsend, D. J. & Erb. M. Children's strategies for interpreting complex comparative questions. Journal of Child Language, 1975, 2, 1-7.

Wales, R. J. & Campbell, R. On the development of comparison and the comparison of development. In G. B. Flores d'Arcais & W. J. M. Levelt (Eds.) Advances in psycholinguistics. Amsterdam: North-Holland, 1970, 373-396.

Webb, R. A., Oliveri, M. E., & O'Keeffe, L. Investigations of the meaning of "different" in the language of young children. Child Development, 1974, 45, 984-991.

Weiner, S. L. On the development of more and less. Journal of Experimental Child Psychology, 1974, 17, 271-287.

Weinrich, U. Explorations in semantic theory. In D. D. Steinberg & L. A. Jakobovits, Semantics: An interdisciplinary reader in philosophy, linguistics, and psychology. London: Cambridge University Press, 1971, 308-328.

Wilcox, S. & Palermo, D. S. "In," "on," and "under" revisited. Cognition, 1974, 3, 245-254.

REFERENCE NOTES

1. Carey, S. "less" may never mean more. Unpublished manuscript, M.I.T. Department of Linguistics, 1975.

2. Keller-Cohen, D. Deictic reference in children's speech. Paper presented at the Winter Meeting of the Linguistic Society of America, December, 1973.

3. Tashiro, L. On the acquisition of some non-comparative terms. Senior Honors Thesis, Stanford University, 1971.

4. Wilcox, S. & Palermo, D. S. If less means more so does dax. Paper presented at the 49th Annual Meeting of the Midwestern Psychological Association, Chicago, 1977.

Footnotes

1. These findings agree with observations on the author's son, who at age three used strong to describe a loud sound and light to describe a soft sound. He also used hard and heavy when describing bright lights. My records of such substitutions contain no exceptions: He always respected the polarity of the correct adjective. In other words, while he frequently crossed dimensional lines, he never violated polar distinctions.

2. There is a question, however, as to whether the psychological interpretation should be denotative, in which case fat is the more extended and therefore the positive term, or connotative, in which case fat is regarded as a negative personal characteristic in many cultures (c.f. Osgood, May, & Miron, 1975).

3. Frequent instances of the use of more in its recurrence sense occur in the transcripts of very early speech (Bloom, 1970). It could be argued that this is the initial sense of more. It is surely also the developmentally simpler sense, since it presupposes only the recognition of object constancy and perceptual similarity, rather than the logic of comparative quantity. Less might also have an initial sense which is the opposite of recurrence, referring to the removal of an object once in view.

4. At five years of age, the author's son developed an effective way of describing a series of relative amounts. The largest amount was said to be "more" than the smallest, while the next largest amount was "less more" than the first. At about age six, he used the same strategy with less, describing one quantity as being "less" than another, while a third quantity was "more less" than the second. Neither of these is linguistically impossible, in

fact both are fully interpretable. What they demonstrate is the child's ability to turn language on its ear--to apply the comparative less to the quality of moreness, and the comparative more to the quality of lessness. Apparently once a quantity was described as being more than another, some sense of linguistic equity would not then allow him to call the same quantity less than a third; hence, it was described as being less more, and so forth.

5. On the subject of experimental artifacts, Harris and Strommen (1972) reported interesting order effects on their (5-7 1/2 year old) subjects' preferred patterns of placement with both fronted and nonfronted objects. The critical variable appeared to be whether or not the object referent condition had been preceded by a self-referent condition in which the child placed objects with respect to his own front, back, and side. With a preceding (as compared to a following) self-referent condition, children were a great deal more likely to (a) orient fronted objects facing themselves, regardless of whether the object was placed in the front, back, or beside a second object, and (b) place nonfronted reference objects such that front was interpreted as between the subject and the fixed object and back as the fixed object between the subject and the reference object. The authors link these two effects causally, proposing that the former is responsible for the latter. They suggest that the effect of the self-reference condition was to make it more likely the child would ascribe frontness to a nonfronted object and see it as "facing him." The position in front of such an object is thus the space between the child and the object.

When the self-reference condition followed this condition, there was a corresponding increase in the tendency to orient fronted objects facing in

the same direction as the subject (i.e., turned away from him), and a corresponding increase in the tendency to place nonfronted objects on the other side of the fixed object in response to front, and between the subject and the fixed object in response to back. This likewise suggests that the child projected a front onto the frontless fixed object and imagined that the front was facing away from him; hence the front of such an object would be on the opposite side from the child and the back would be between the child and the object.

While we cannot, of course, be certain that the 5-7 1/2 year olds in Harris and Strommen's study were actually projecting imaginary fronts onto featureless objects, the explanation is plausible. The finding brings to light a definite problem with interpreting children's placements to front/back/side instructions on linguistic criteria alone. A child who ascribes an imagined front to an object may be responding correctly (but non-deictically) to the instructions, placing a second object appropriately with respect to the imagined front. If we accept Tanz's finding of virtually errorless performance with front and back beyond age four, and assume this is about the age at which these terms are acquired, then the fact that many of Harris and Strommen's 5-7 1/2 year olds were still placing featureless objects "incorrectly" on linguistic (deictic) criteria suggests that these responses reflect nonlinguistic strategies for dealing with the task. To a child, the requirement that he place one object in front or in back of, say, a plain box, may seem somewhat arbitrary. Some children may try to reduce the arbitrariness by mentally adjusting the reference context so that the instructions make more sense, namely by projecting a front/back axis onto the featureless object and responding accordingly, keeping the imagined "front" orientation of the object in mind.

Hence, when dealing with frontless objects, there is no purely linguistic basis for establishing the correctness of the child's response, unless we are willing to assume that children do not project front/back characteristics onto ostensibly featureless objects, and Harris and Strommen's observations make such an assumption less tenable. Further, what adults would do under similar instructions has never been tested; adult standards of correctness in these tasks have simply been assumed.

We should note, finally, that the term back does not really have a deictic sense, although all investigators mentioned have assumed that it does. The deictic opposite of in front of is behind, not in back of. Back is actually only interpretable in the absolute sense, i.e., with fronted objects. The use of back in these instructions probably increases the probability that children will project an imaginary front/back axis onto the featureless object so that back may be interpretable in an absolute sense.